

POSTER ABSTRACTS – REDNEX SYMPOSIUM

Effect of starch origin on ruminal fermentation and passage of starch and nitrogen to the small intestine of cows

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Two origin of starch - maize and wheat were tested by using four non lactating cows with rumen and duodenal T - cannules in the experiment. Cr₂O₃ was used as a marker of nutrient flow to the duodenum. Cows were fed diets consisting of %: forage 70, maize and/or wheat meal 27 and/or 29, soyabean meal 2 and Vitamix S 1, on dry matter basis. Starch origin did not affect ruminal fermentation significantly. Concentration of all VFA was higher with wheat than with maize meal. The mean of acetate : propionate ratio was significantly higher (P<0.05) when wheat was fed. Maize in the diet significantly increased the flow of starch to the duodenum (21.4 % vs. 10.2 % from the daily intake). With both diets higher amounts of crude protein and amino acids passed to the duodenum than were ingested (101.8 % with wheat and 130.4 % with maize). In comparison with intake, flow of essential lysine (176.6% and 140.8 %) and nonessential glycine (289.7 % and 186.4 %) were the highest. It means that availability of energy and nitrogen by microbes in the rumen is more effective from maize than wheat as the starch origin.

***In vivo* digestibility of organic matter of total mixed ration based on concentrate supplementation**

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The aim of the current research (project No. NAZV QH81309 and MZE0002701404) was to determinate the *in vivo* sheep digestibility of organic matter (OMD) of a total mixed ration (TMR) with and without the concentrate supplement. TMR samples were analyzed for contents of dry matter, crude protein (CP), ether extract (EE), crude fibre (CF), nitrogen-free extract (NFE), neutral detergent fibre (NDF), acid detergent fibre (ADF), acid detergent lignin (ADL), gross energy (GE) and OMD. For *in vivo* experiments were used seven Romanovské breed wethers. The control TMR, containing maize and alfalfa silages and without the concentrate supplement (fed at 6.2 kg of TMR/animal/day), was initially evaluated with all animals. The experimental TMR, supplemented with 680 g/animal/day concentrate, was fed at 4.4 kg of TMR/animal/day to the same group of animals. The feed ration was offered twice a day, at 6 a.m. and at 6 p.m. The animals had free access to drinking water. During the main *in vivo* experimental period, feed intake and the amount of residual feedstuff and faeces were measured on a daily basis. Average values of control TMR of 264.3, 158.0, 19.0, 292.2, 450.8, 349.8, 76.1, 436.5 and 94.4 g/kg of dry matter and 19.4 kJ/g of dry matter were obtained for dry matter, CP, EE, CF, NDF, ADF, ADL, NFE, ash and GE, respectively. Average values of experimental TMR of 336.6, 155.2, 11.0, 219.4, 432.0, 265.1, 56.7, 533.1 and 81.3 g/kg of dry matter and 19.3 kJ/g of dry matter were obtained for dry matter, CP, EE, CF, NDF, ADF, ADL, NFE, ash and GE, respectively. *In vivo* OMD averaged 70.7 % for the control TMR and 73.0 % for the experimental TMR. No significant difference (P<0.05) was found between the control and experimental TMR.

Environmental Aspects of Alfalfa Silage Inoculation: Nutrient Digestibility And Nitrogen Retention in Wethers

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The objective of the study was to investigate the effect of silage additives on fermentation process, apparent nutrient digestibility and nitrogen-retention. First experiment: investigation of a silage additive and fermentation of alfalfa in model silo system. Density: 301 dm kg /m³. Biological additive (sil all 4x4, alltech inc.): 4 homofermentative lactic acid bacteria and 4 enzymes. Inoculation accelerated the ph-drop and decreased the final ph (control and inoculated silage on the 2nd day: 6.14a vs 5.83b; 5th day: 5.80a vs 5.07b; 32nd day: 4.77a vs 5.02b). Silage additive increased the lactic acid content (2nd day: 6.13a vs 21.9b; 5th day: 10.4a vs 43.5b; 32nd day:36.1a vs 54.8b g/kg dm). Conclusion: inoculation accelerated the fermentation process in alfalfa silage, presumably improving protein quality. Second study: determination of protein quality, apparent nutrient digestibility and nitrogen-retention of inoculated alfalfa silage in wethers. Density of 200 dm kg/m³. Silage additive (sil all - fire guard, alltech inc.) Contained: 4 homofermentative lactic acid bacteria, 4 enzymes and 2 salts. Inoculation improved significantly the apparent nutrient digestibility of crude protein (75a vs 77b), crude fiber (49a vs 54b), organic matter (68a vs 71b) of alfalfa haylage. Biological silage additive slightly improved the nitrogen-retention (control: 30.6%; inoculated: 31.1%). Conclusion: silage additive improved apparent protein digestibility and decreased nitrogen-loss, therefore has beneficial effect and potential environmental role.

Influence of different sources of concentrates on apparent digestibility of nutrients and balance of nitrogen in cattle

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We investigated the effects of feeding diets with different starch sources on apparent nutrient digestibility and nitrogen balance. The basis of the diets was meadow hay supplemented with wheat meal (diet *a*), or maize meal (diet *c*), or their combination at a 1 : 1 ratio (diet *b*). The experiment was performed on six Black-Spotted bulls with mean live weight of 304±17 kg, which were fed twice daily at 06.00 and 18.00. Each period consisted 19 days. An 11-day adaptation period was followed by an 8-day experimental period. Rations were formulated so that the ratio of starch to fibre was 2.1:1 and the percentage of fibre was 16-17% (DM). During the experimental period, faeces and urine were collected over 24-h collection periods. Before the morning feed, a subsample of 3% of the 24-h faeces and urine collection was taken for chemical analysis. Significance of differences between feed rations was evaluated by *t*-test with program SAS. The apparent digestibility of dry matter (72%), fibre (52%) and organic matter (74%) was significantly higher by offering wheat meal combined with maize meal. Most crude protein (69%) showed significant apparent digestibility when bulls were offered wheat meal, but their effectiveness was higher significantly for wheat meal combined with maize meal. The highest percentage of nitrogen retained out of both N intake and digested nitrogen was found in this experiment with feeding wheat meal combined with maize meal (treatment *b*).

Key words: wheat meal, maize meal, starch, fibre, digestibility of nutrients, nitrogen balance

The effect of different die thickness on the stability of amino acids in pelleted dairy cow feed.

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In this paper, it was investigated how different thickness of die at pellet press affects stability of amino acids in pelleting process. Diameter of openings of pellet die was 6 mm, and die thickness was 18 mm (1:3) and 48 mm (1:8), respectively. For this study the complete mixture for dairy cows was acquired. Mixture was made from corn, wheat meal, sunflower meal, soya meal, limestone, dicalcium phosphate and premix. Complete mixture was conditioned up to 80°C, and moisture content of about 16 % was achieved. Temperatures of the dies 1:3 and 1:8 were 57,6°C and 64°C, respectively. Amino acids were determined with HPLC using the AccQTag method. It can be concluded that slight decrease of amino acid content can be observed in pelleting process. For die 1:3 total amino acid content decreased by 2,21 % and with die 1:8 (thicker die) it decreased by 3,85 % because of higher temperature in the pelleting process.

Key words: *amino acids, HPLC, die, pelleting process, conditioning, moisture content*

Influence of energy supply pre- and postpartum on performance and metabolic parameters in dairy cows

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During the transition period the metabolism of dairy cows undergoes tremendous challenges. Feeding strategies to minimize the disease incidence in the first weeks of lactation are needed. The objective of this study was to investigate the impact of different energy levels (E) before (PRE) and after parturition (POST) on performance and metabolism. Therefore 81 cows were used in a 2-factorial feeding trial ($3 E_{PRE} \times 3 E_{POST}$) with diets meeting 75% (L), 100% (M) and 140_{PRE}/125%_{POST} (H) of their energy demands for 12 weeks before until 15 weeks after parturition. Procedure GLM of SAS was used for statistical analysis of milk production data, procedure MIXED for analysis of blood metabolites including weekly taken samples as repeated measurements. E_{POST} had the greatest impact on production and metabolism parameters. Energy corrected milk yield (ECM) was 21.4, 30.0 and 32.5 kg in groups L_{POST} , M_{POST} and H_{POST} , respectively. Milk protein content was 3.00% in L_{POST} , 3.27% in M_{POST} and 3.40% in H_{POST} . The effect of E_{PRE} on milk yield also was significant (25.4, 28.5 and 30.0 kg ECM in groups L_{PRE} , M_{PRE} and H_{PRE}). Increasing negative energy balance when feeding dairy cows below recommended energy requirements led to significant changes in glucose (2.46, 2.93, 3.01 mmol/l in L_{POST} , M_{POST} and H_{POST} , respectively), β -hydroxybutyrate (BHBA; 1.37, 0.88, 0.70 mmol/l), nonesterified fatty acids (0.26, 0.14, 0.13 mmol/l) and other metabolic parameters. Accumulation of ketone bodies in group L_{POST} was highest 4 to 6 weeks after parturition indicating ketosis. BHBA figures of group M_{POST} also reached subketotic levels. E_{PRE} had only minor effects on metabolic parameters. To avoid negative effects on milk production cows should not be fed below recommended energy requirements in the dry period whereas overfeeding increases risk of fatty liver postcalving.